REMARKS

Claims 1 - 27 are currently pending in the application. Claims 1-22 have been amended. As indicated in the amendment of March 6, 2006, in Claims 4-5, 15-16, 25-26, the mathematical notation "looks" different than in the original claim, but no substantive amendment is being made.

Claims 1-27 were rejected under 35 U.S.C. 101. This rejection is traversed in view of the amendments above.

At the outset, claims 22-27 have not been amended. As the Examiner will recognize, allocation of computer resources in a Web Server farm is by definition a method which uses technological resources, and yields concrete tangible results that are quantifiable in the "real world". The Web Server farm application is discussed in detail in the application beginning on page 6. However, it should be recognized that the invention can be implemented with a variety of other applications which yield tangible (e.g., profit) or intangible (e.g., goodwill) results. To address the rejection claims 1-21 are now required to be computer implemented methods (Figure 1 et seq. show implementation in a computer system), and require that the "benefit" which is based on the benefit gained associated with one or more customer's demands, is embodied in a concrete tangible result through implementing the time-varying allocation of resources amongst one or more customers to yield said benefit.

As revised, claims 1-21, as well as claims 22-27 in their original form, should satisfy all of the requirements of 35 U.S.C. 101.

Claims 1-27 were rejected under 35 U.S.C. 112, second paragraph. This rejection is traversed in view of the amendments above.

Similar to the revisions made in view of the non-statutory subject matter, the result indicated in the preamble is now "produced" by, for example, the implementing the time-varying allocation of resources step. Claims 22-27 satisfied the requirements of 35 U.S.C. 112, second paragraph as originally filed for the same reasons noted above with respect to the non-statutory subject matter rejection.

Claims 1-27 have been rejected as being obvious over U.S. Patent Publication 2005/0256778 to Boyd in view of "TCP Dynamic Acknowledgment

Delay: Theory and Practice" by Dooly et al., Proceedings of the 30th annual ACM symposium on Theory of computing. ACM Press 1998. This rejection is traversed.

The Boyd reference has been discussed in previous responses as well as the pre-appeal brief request for review. The undersigned raised objections to the interpretation of this reference in those response, and maintains those positions herein.

As explained previously by example, an embodiment of the invention may have *s* Web sites to be served by *k* Web servers. (For simplicity, assume that all servers are identical.) Time is divided into units, and it is assumed that the demand of a Web site is uniform in each unit of time. Each server has a "service rate" which is the number of requests to a Web site each server can serve in one unit of time. Without loss of generality, demands may be normalized by the service rate so that a server can serve one request per unit of time and demands of a site may be fractional. A Web server can be allocated to no more than one site at each unit of time, and it takes a time unit to change the allocation of a server. (Specification at 8, lines 7-15)

Such a resource allocation problem may be modeled and solved mathematically, with time being divided into intervals, according to the claimed invention. (Specification at 4, lines 9-10) A general process implemented by a dynamic resource allocator 14 may begin in function block 21, at which current and forecasted per-customer demands and revenues may be obtained. Current allocations of servers may be obtained in function block 22, and new allocations may be computed in function block 23. The computed new allocations may then be compared with current allocations in decision block 24. In function block 25, if a difference has been found in function block 24, reallocated servers may be directed to serve their new customers before the process loops back to function block 21. If no difference is found in function block 24, the process goes directly from function block 24 to function block 21, to begin anew without passing through function block 25. (Specification at 7, lines 17-27, referring to Figure 2)

The Boyd and Dooly references would not be combined by one of ordinary skill in the art as the Examiner has suggested because the solve different problems by different mechanisms, and are otherwise unrelated. Furthermore, even if the

two references could be combined, the resulting product would not include the features of the recited claims or make them obvious to one of ordinary skill in the art.

Boyd solves a very different problem (pricing) from the present application (resource allocation). In a pricing problem, prices must be determined. In present application, as illustrated by the server allocation problem, prices are fixed and it must determined how much of the "goods" should be "sold" to each customer.

Again, it appears there is some confusion in the office action between "time-varying allocation of fixed resources" and "allocation of time-varying resources." For example, the office action erroneously suggests it would have been obvious to combine Boyd with a time-varying resource allocation to provide means to optimize a resource that varies with time. This conclusion incorrectly implies that the invention is akin to a system of optimizing a resource that varies with time. However, it should be understood that the invention is of the other type, i.e., one that finds a time-varying allocation of fixed resources.

Dooly is not an analogous art as suggested in the office action. The Dooly algorithm determines how much of a resource should be expended to solve a problem. In contrast, the invention determines how to divide a fixed amount of resources among a set of competing demands.

The office action incorrectly states in several locations that Dooly teaches that it is known to find a time-varying resource allocation... paragraph 1 is cited where the network "varies the arrival times into sequences..." However, it should be understood that in Dooly the algorithm partitions the arrival times, i.e., it determines consecutive, disjoint groups of them. (For instance, the sequence "2 5 7 8 10" might be partitioned into two subsequences "2 5 7" and "8 10.") Second, the examiner confuses input values, beyond the control of the algorithm, with output values, i.e., the results of the algorithm. The sequence of arrival times of data from the network is an input to the Dooly algorithm, and is not the allocation of resources determined by the algorithm as implied in the office action. Thus the quanities that vary over time in the two algorithms (Dooly and the present invention) are very different.

From the descriptions of the problems solved above, it is also clear that no combination of Dooly and Boyd can be used to solve the problem solved by the

present invention. Neither Boyd nor Dooly determines a time-varying allocation of resources to customers as does the claimed invention, despite the examiner's statements to the contrary. Therefore, no combination of Boyd and Dooly would make the claimed invention obvious.

Furthermore, a unique aspect of the problem solved by the present invention is that there is a cost associated with varying the allocation over time. The invention trades off that cost with the benefit gained by reallocating resources to customers based on their demand (i.e., if a customer is willing to buy more, at the same per-unit cost, the implementation of the claimed method may reallocate resources to that customer from some other customer). This aspect is wholly missing in both Boyd and Dooly.

With respect to the "newness" and "unobviousness" of the invention, the Dooly paper was presented at the same conference (STOC) as the present invention, although the Dooly paper was presented three years earlier. The program committee, which is comprised of a group of mathematicians and computer scientists and other members of the research community who reviewed the paper, should have been aware of all the concepts listed as pertinent from the Boyd application, and also the Dooly result. These reviewers are world-leading experts, and are aware of ideas that are on the frontiers of research, as well as information that might be known by one of ordinary skill in the art. This group accepted the paper of the inventors of this application as reporting new and significant research. Thus our invention was not at all obvious to one of ordinary skill in the art that might have full knowledge of both Dooly and Boyd.

In addition to the above, with respect to the rejection of claims 2, 13, and 23, the office action presents statements that appear to be confused regarding the purpose and achievement of our invention. The office action erroneously cites the combination of 105 "predicting future customer demand" and 250 of Boyd, and later refers to combining Boyd and Dooly to provide a means to anticipate future demands (as well as to allocate resources). However, it will be recognized that the invention does not predict future demands; instead, future demands are presented as inputs to the algorithm, and it is assumes that they are found by some method outside our invention. (And in fact such methods exist.)

Furthermore with respect to the rejection of claims 4-5, 15-16, 25-26, and

also the rejection of claims 2, 13, and 23: lookahead and competitive ratio are by no means unique to Dooly. These are well-known concepts common to many online optimization problems. These concepts alone are not enough to solve every such problem. These concepts also cannot simply be combined with existing (offline) optimization solutions to yield an online solution, as the office action suggests. The online version of a problem is of a very distinct nature from the offline version. There is a large body of literature, in which many different online problems are solved, and each is considered to be a significant new development in the field; i.e., not obvious to one of ordinary skill, or even to a world expert.

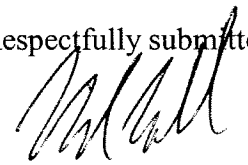
Finally, with respect to the rejection of claims11 and 21: Dooly does not optimize allocation of computer cycles. Instead, it optimizes network transmission capacity, commonly referred to as "bandwidth", and also attempts to minimize delay of users' data transmission (see paragraph 15 of Dooly). Also, with respect to claims 12 and 22, the office action is contradictory and refers to customer demand as both a resource and a benefit: "associating demand with benefit gained," p. 8, 3rd and 4th line from bottom; vs. demand referred to as a resource p. 9, last line of rejection of 12. This language is repeated in the rejection of claim 22.

In view of the foregoing, it is requested that the application be reconsidered, that claims 1 - 27 be allowed, and that the application be passed to issue.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at 703-787-9400 (fax: 703-787-7557; email: Mike@wcc-ip.com) to discuss any other changes deemed necessary in a telephonic or personal interview.

If an extension of time is required for this response to be considered as being timely filed, a conditional petition is hereby made for such extension of time. Please charge any deficiencies in fees and credit any overpayment of fees to Deposit Account 50-0510 (IBM-Yorktown).

Respectfully submitted,



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